

Distributional and Ecological Notes on some of Illinois' Burrowing Crayfishes

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ABSTRACT

Recent field work has shown the prairie or grassland crayfish, *Procambarus gracilis*, to occur commonly in forested regions of northeastern Illinois and the digger crayfish, *Fallicambarus fodiens*, to persist in similar habitats of that same region. In addition, a search of major museum holdings revealed a new drainage record for *F. fodiens* in Illinois. Both results demonstrate that there is still much to learn about Illinois decapod crustaceans and highlight the need for continued research.

INTRODUCTION

Based primarily on the amount of time individuals spend below ground, burrowing crayfishes have been assigned to one of three categories: primary, secondary, and tertiary burrowers (Hobbs 1989). Primary burrowers usually spend the majority of their life cycles in burrows, emerging only briefly to forage for food or to mate. Females of most primary burrowers will migrate to standing water habitats for a limited time period, usually in the spring, to disperse their young. Because of these behaviors, primary burrowers are difficult to collect and often are underrepresented in faunal survey collections. Likewise, ecological information on primary burrowers is often rudimentary.

Three primary burrowing crayfish species are known to occur in Illinois (Hobbs 1989; Page 1985): *Cambarus diogenes* Girard 1852, a common inhabitant of the central United

States from northern Minnesota to the gulf coast and the Atlantic Piedmont and Coastal Plain (Jezerinac 1993); *Fallicambarus fodiens* (Cottle 1863), known from the Great Lakes (except Lake Superior) to the gulf coast and the central Atlantic Piedmont and Coastal Plain (Hobbs and Robison 1989); and *Procambarus gracilis* (Bundy 1876), known from western Indiana and southeastern Wisconsin to southeastern Nebraska, eastern Kansas and Oklahoma, and northeastern Texas (Page 1985). We report here on ecological observations of *Procambarus gracilis*, new distributional records for *Fallicambarus fodiens* obtained during general crayfish surveys conducted from 1996 to 1998 in northeastern Illinois, and on a new Illinois *F. fodiens* record from museum holdings.

MATERIALS AND METHODS

In an effort to document the crayfish fauna of properties owned by the Cook County Forest Preserve District, general sampling of aquatic and semi-aquatic habitats was conducted from July 1996 to May 1998. Additional sites in adjoining DuPage, Lake, and Will counties were sampled from May 1997 to June 1998. A total of 21 sites was sampled during the above time frame. Crayfishes were collected using several methods: hand-held dip nets, 1.5 m x 3.0 m minnow seine, and unbaited wire mesh minnow traps. Voucher specimens were deposited in the Illinois Natural History Survey Crustacean Collection. At Swallow Cliff Forest Preserve, located approximately 2.5 km NW of the town of Palos Park (T37N, R12E, Sec. 28), Cook Co., Illinois, 6 minnow traps were submerged in a vernal pond from 1 May to 1 July 1997; traps were checked every 48 hours. Crayfishes collected in the traps were identified, sexed, and returned to the water. The Crustacean Collection of the United States National Museum, Smithsonian Institution (USNM), also was searched for additional Illinois *F. fodiens* records.

RESULTS

During 1996 and 1997 we frequently collected *Procambarus gracilis*, commonly known as the prairie (Williams et al. 1989) or grassland (Pflieger 1996) crayfish, from shallow vernal ponds located in closed-canopy mesic hardwood forests (Fig. 1, Appendix 1). Forest soils of the Morley silt loam and Blount silt loam series were the dominate types found at these sites (Soil Conservation Service 1970, Soil Conservation Service 1979, Soil Conservation Service 1980).

On 28 April 1997 a population of *P. gracilis* was discovered at the Beaubien Woods/Flatwood Lake Forest Preserve in southern Cook County. The crayfishes were collected around the edges of a 15 acre human-made fishing lake. This small (289 acre) highly disturbed forest preserve is located in one of the most urbanized and industrially developed regions in the Chicago metropolitan area. It is bordered on the south by the Little Calumet River, on the west by the community of Altgeld Gardens, and on the north and east by Interstate 94 and municipal refuse land fills. Very little native vegetation remains in the Forest Preserve.

The digger crayfish, *Fallicambarus fodiens*, was collected from 11 previously unrecorded northeastern Illinois locations between 1996 and 1998 (Fig. 2, Appendix 2). Our sampling also reconfirmed the presence of the species at one historical site (Tinley Woods Forest Preserve, Cook Co.). At all of these locations, the species was collected from ver-

nal woodland ponds (Fig. 1) using dip nets and/or unbaited wire mesh minnow traps. Water depths in these ponds ranged from 0.1 to 0.4 m. The species also was collected from 2 locations in the upper Embarras River drainage of southeastern Illinois (Appendix 2, Fig. 2). In addition, examination of material in the USNM Crustacean Collection revealed the first record for *F. fodiens* from the Kaskaskia River drainage in southwestern Illinois (Fig. 2, Appendix 2).

Since individuals of *F. fodiens* collected in minnow traps at the Swallow Cliff Forest Preserve were returned to the pond after being identified, it is difficult to estimate population size. However, on several occasions 15 individuals were trapped in a 48 hr. period. Trapping efforts at two other sites, MacArthur Woods Nature Preserve and Edward L. Ryerson Nature Preserve, produced 20 and 17 individuals, respectively, in a two-week period. At both of these preserves, approximately 5 to 10% of the suitable habitat was sampled.

DISCUSSION

Page (1985) listed *F. fodiens* as occurring historically in the Ohio, Big Muddy, Sangamon, Illinois, and Lake Michigan drainages of Illinois. During his statewide survey of Illinois decapods, Page (1985) did not collect *F. fodiens* from the northern half of the state. This, most likely, precipitated his hypothesis that the species had experienced a range reduction in northern and central Illinois. Our recent collections of *F. fodiens* indicate that in northeastern Illinois, the species occurs in the Kankakee River drainage and still occurs commonly in the Des Plaines River drainage. In this region, the species was always encountered in shallow vernal ponds within closed-canopy mesic hardwood forests (Fig. 1). Vegetation in these ponds are dominated by sedges of the genus *Carex*. In extremely urbanized northeastern Illinois, this type of habitat is found almost entirely in state- or county-owned Forest Preserves and Nature Preserves. The presence of *F. fodiens* in these preserves reinforces the need for the protection of unique habitat types in regions experiencing rapid urban growth if native biodiversity is to be preserved. A newly discovered USNM record from the Kaskaskia river drainage, collected in 1972, and two records from the upper Embarras River drainage (Fig. 2) collected in 1997 and deposited in the INHS Crustacean Collection indicate that *F. fodiens* is more widespread in the southern one-third of Illinois than previously known.

Using soil as the indicator for past plant communities (Buol et al. 1989), sites at which *P. gracilis* were collected were likely forested in pre-settlement times. Previous authors (Page 1985, Pflieger 1996, Downing 1924, and Creaser 1932) suggest that *P. gracilis* may be restricted to grassland (or former grassland) and prairie regions throughout its range. In southeastern Wisconsin, the presumed range of *P. gracilis* occurs in areas that were once dominated by oak savanna, prairie, and sedge meadow (Hobbs and Rewolinski 1985). Our results indicate that, in northeastern Illinois, *P. gracilis* also occurs commonly in habitats that have historically been and continue to be densely forested and suggest that the species has a wider tolerance of habitat conditions than previously thought. *Procambarus gracilis* has now been recorded from several habitat types including prairies or former prairies, roadside ditches, wet meadows, and vernal ponds in mesic forests. The inability of crayfishes to tolerate habitat degradation and low water quality has been suggested (World Wildlife Fund 1990), as has their use as indicators of environmental

quality (The Nature Conservancy 1996). The Beaubien Woods/Flatwood Lake Forest Preserve population demonstrates the ability of *P. gracilis* to persist within disturbed habitats, which in turn may preclude its use as an indicator species. Further research is needed to determine whether other burrowing crayfishes show a similar resiliency to disturbance.

Recently, Taylor et al. (1996) highlighted the depauperate state of North American crayfish biogeographical literature and emphasized the need for current distributional and biological data. The above results provide new information for two burrowing midwestern species and demonstrate that there is still much to gain from future faunal surveys and field observations of crayfishes in areas that have been well sampled.

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Appendix 1. Forested sites at which *Procambarus gracilis* was collected during 1996 and 1997. Museum catalog numbers are indicated parenthetically, dates are those on which voucher specimens were collected.

Cook County

1. Ned Brown Forest Preserve, 3.2 km S Rolling Meadows; T41N, R11E, Sec. 17, SE1/4. 17 April 1996 (INHS 5673).
2. Ned Brown Forest Preserve, 1.6 km SE jct. I-90 and I-290; T41N, R11E, Sec. 17, NW1/4. 2 April 1997 (INHS 5932).
3. Deer Grove Forest Preserve, 4.0 km E Barrington; T42N, R10E, Sec. 4, NW1/4. 2 April 1997 (INHS 5942).
4. Deer Grove Forest Preserve, 4.0 km E Barrington; T42N, R10E, Sec. 4, SE1/4. 30 May 1997 (INHS 6001).
5. Swallow Cliff Forest Preserve, 1.2 km SW jct. U.S. Hwy. 45 and IL Rt. 83; T37N, R12E, Sec. 28, NE1/4. 31 March 1997 (INHS 5953), 28 May 1997 (INHS 6008).
6. Steger Woods Forest Preserve, just N of Sauk Trail Ave.; T35N, R14E, Sec. 31, NE1/4. 3 June 1997 (INHS 5999).
7. Somme Woods East Forest Preserve, 0.5 km N Northbrook; T42N, R12E, Sec. 3, SW1/4. 2 June 1997 (INHS 6000).

Lake County

8. Edward L. Ryerson Nature Preserve, 1.6 km S Lincolnshire; T43N, R11E, Sec. 26, NE1/4. 28 May 1997 (INHS 6011)

Will County

9. Goodenow Grove Forest Preserve, 5.6 km E Crete; T34N, R14E, Sec. 13, NE1/4. 4 June 1997 (INHS 6002).

Appendix 2. Locations for new Illinois records of *Fallicambarus fodiens*. Drainage basin and Museum catalog numbers are indicated parenthetically, dates are those on which voucher specimens were collected. dr. = drainage.

Cook County

1. Plum Creek at Plum Creek Forest Preserve (Lake Michigan dr.); T35N, R15E, Sec. 32. 2 April 1997 (INHS 5718).
2. Vernal pond at Swallow Cliff Forest Preserve, 1.2 km SW jct. U.S. Hwy. 45 and IL Rt. 83 (Des Plaines R. dr.); T37N, R12E, Sec. 28, NE1/4. 12 May 1997 (INHS 5931) and 23 May 1997 (INHS 6003).
3. Vernal pond at Ned Brown Forest Preserve, 3.2 km S Rolling Meadows (Des Plaines R. dr.); T41N, R11E, Sec. 17, SE1/4. 29 April 1998 (INHS 6658).

Crawford County

4. Maple Creek 5 km WSW Annapolis (Embarras R. dr.); T8N, R13W, sec. 16, SW. 18 May 1997 (INHS 5870).

Cumberland County

5. Field 5 km NNE Greenup (Embarras R. dr.); T10N, R9E, sec. 24, SE. 14 April 1997 (INHS 5980).

DuPage County

6. Vernal pond 4.0 km S Willowbrook (Des Plaines R. dr.); T37N, R11E, Sec. 11, NW1/4. 28 May 1997 (INHS 6013).
7. Vernal pond at Wood Dale Grove Forest Preserve, 0.8 km S Wood Dale (Des Plaines R. dr.); T40N, R11E, Sec. 22, NW1/4. 8 June 1998 (INHS 6709).

Lake County

8. Vernal pond at Edward L. Ryerson Nature Preserve, 1.6 km S Lincolnshire (Des Plaines R. dr.); T43N, R11E, Sec. 26, NE1/4. 2 April 1998 (INHS 6653)
9. Vernal pond at MacArthur Woods Nature Preserve, 1.6 km SE Libertyville (Des Plaines R. dr.); T44N, R11E, Sec. 34, SE1/4. 15 April 1998 (INHS 6655)
10. Vernal pond at Elm Road Forest Preserve, 1.6 km S Mettawa (Des Plaines R. dr.); T43N, R11E, Sec. 11, SW1/4. 15 April 1998 (INHS 6652)

Monroe County

11. Roadside ditch 3.2 km E Burksville (Kaskaskia R. dr.); T3S, R9W, Sec. 20, NW1/4. 1972 (USNM 133487).

Will County

12. Vernal pond at Raccoon Grove Forest Preserve, 2.8 km SSW Monee (Kankakee R. dr.); T34N, R13E, Sec. 32, NE1/4. (INHS 6005).
13. Vernal pond along Old Post Rd., 2.4 km ESE Crete (Lake Michigan dr.); T34N, R15E, Sec. 7, SW1/4. (INHS 6706).

Figure 1. An example of the habitat in which *Fallicambarus fodiens* and *Procambarus gracilis* were frequently collected during the present study: a vernal pond within closed-canopy mesic hardwood forest.



Figure 2. Distribution of *Fallicambarus fodiens* in Illinois. Open (large = 1890-1901, small = 1950-1955 collections) and closed circles (1972-1982 collections) are localities reported by Page (1985); triangles denote localities at which the species was collected during the present study; square denotes USNM record for Kaskaskia River drainage.

